NOTES FOR STUDENTS.

IN A PAPER by C. Warnstorf, entitled "Beiträge zur Kenntniss exotischer Sphagna,"[6] in the midst of a large number of new species from Brazil, Australasia, South Africa and Reunion, two new Sphagna subsecunda from the United States are described, and several new stations given for species already known. One of the new ones is *S. Langloisi*, from St. Martinsville Louisiana, and the other *S. xerophilum*, from Alabama.—C. R. B.

MR. CHARLES H. PECK'S annual report for the year 1895, as state botanist of New York, was recently issued. Beside the bare list of additions to the herbarium and names of contributors, it contains observations upon fifty species of plants not before reported for the state of New York, of which seventeen species, all fungi, are described as new to science. There are also remarks on thirty-one other species, over half being flowering plants; seven species of the fungi have new varieties described. The New York species of the genus Collybia, numbering thirty-four, are monographed, with revised descriptions, extended notes and carefully prepared keys, together with a key to the twenty extra-limital species. Ten species of edible fungi, and one unwholesome species, are described and illustrated with colored quarto plates, forming a supplement to the notable issue of the previous year, The quarto form fits in badly with the octavo form previously adopted, but as the plates only are in quarto, they can be once folded when bound, and by this simple means the whole series kept uniformly in octavo.—J. C. A.

ITEMS OF TAXONOMIC INTEREST are as follows: John K. Small[7] has described some additional new species (Vicia, Samolus, Limonium, Eupatorium, Chrysopsis, Silphium) from the South Atlantic states. Edward L. Greene[8] has described some new Compositæ (Coleocanthus, Erigeron, Machæranthera, Gaillardia) from New Mexico and Arizona. Eugene P. Bicknell has described a new species of Asarum[9] heretofore confounded with *A. Canadense*, and two new species of Sanicula.[10] Mrs. E. G. Britton[11] has published a revision of the North American species of Ophioglossum, recognizing eight species, two of which are new. *O. vulgatum* of the southwest is *O. Engelmanni* Prantl. T. H. Kearney[12] has published a very interesting series of plants from eastern Tennessee, several of which are new (Cimicifuga, Stylosanthes, Scutellaria, Xanthium). Miss Alice Eastwood[13] has begun a series of papers entitled "Studies in the herbarium and the field," the first number containing new forms of Œnothera and Bigelovia, two new spurless forms of

[6] Hedgwigia, **36**: 145–176. 1897.
[7] Bull. Torr. Bot. Club **24**: 490–493. 1897.
[8] *Ibid.* 511–512.
[9] *Ibid.* 528–536.
[10] *Ibid.* 577–582.
[11] *Ibid.* 545–559.
[12] *Ibid.* 560–575.
[13] Proc. Cal. Acad. Sci. III. 1: 71–88. 1897.

Aquilegia, new species of Iris, Montia, and Newberrya, and three new species of Arctostaphylos. The Royal Botanic Gardens of Trinidad has begun the publication[14] of descriptions of the ferns of the British West Indies and Guiana, by G. S. Jenman, government botanist of the Colony of British Guiana. The first fascicle contains Hymenophyllum and Trichomanes, the former represented by twenty-nine species (two of which are new), the latter by forty-two species (one of which is new). Mrs. Katherine Brandegee[15] has begun a valuable series of papers entitled "Notes on Cacteæ." The first number discusses the forms of Lower California, concerning which the author is specially competent to speak. The race for new African species is becoming more interesting daily, and most of the taxonomic centers of Europe are competitors. Wood and Evans[16] have published a second decade of "New Natal plants;" the work directed by Engler has resulted in a fascicle of ten papers in the most recent number of the *Jahrbücher*,[17] the families presented being Sapindaceæ (Gilg), Acanthaceæ (Lindau), Gramineæ, Cyperaceæ and Commelinaceæ (Schumann), Compositæ (Hoffmann): while Durand and Wildeman[18] have published the first fascicle of a list of Congo plants, among which many new species are described. Hallier[19] has begun the publication of a revision of Convolvulaceæ, the first paper containing Calonyction, all of whose six species belong to the American flora, having been referred usually to Ipomœa and Convolvulus. Huth[20] has published a descriptive list of Japanese Ranunculaceæ, in which seventeen genera are represented, all of which have representives in America. Eighty-three species are enumerated, the largest genera being Ranunculus (13 species), Clematis (12), Thalictrum (12), Anemone (11), Coptis (6), and Trollius (6). Glatfelter[21] has discussed *Salix longipes* and its relation to *S. nigra*.—J. M. C.

THE SUBJECT of contractile roots is assuming larger and more definite proportions. A. Rimpach[22] has summarized the subject, finding that seventy species, representing twenty families of monocotyls and dicotyls, are recorded as possessing contractile roots. The power has been observed only in herbaceous, and chiefly in geophilous plants. The greatest amount of contraction is said to be 70 per cent., and the families most frequently represented are the Liliaceæ, Iridaceæ, Amaryllidaceæ, and Araceæ.—J. M. C.

[14] Bull. Misc. Information **4**: 1–32. 1898.
[15] Erythea **5**: 111–123. 1897.
[16] Jour. Bot. **35**: 487–490. 1897.
[17] Bot. Jahrb. **24**: 305–464. 1897.
[18] Bull. Soc. Roy. Bot. Belgique **36**: 47–97. 1897.
[19] Bull. de l'Herb. Boiss. **5**: 1021–1052. 1897.
[20] Loc. cit. 1053–1096.
[21] Rep. Mo. Bot. Gard. **9**: 1–9. 1897.
[22] Beitr. z. wiss. Bot. (Fünfstück) **2**: 1–28. 1897. Cf. Jour. Roy. Micr. Soc. Dec. 1897, p. 551.

THE EMBRYOGENY of Triticum has been investigated by M. Koernicke.[23] He finds the usual axial row of four mother cells in the ovule, the lowest of which develops the macrospore. As already well known among Gramineæ, the antipodals are most apt to develop a more or less extensive tissue, which the author considers to be accomplished by direct division. The chromosomes were found to be usually sixteen in number in the vegetative cells of the inflorescence, eight in the mother cells of both microspores and macrospores, and sixteen again in the oospore.—J. M. C.

DAVID M. MOTTIER has recently published a paper[24] on the behavior of the nuclei in the development of the embryo sac and the phenomena of fertilization. The plants studied were *Lilium Martagon*, *L. candidum*, *L. umbellatum*, *Helleborus foetidus*, and *Podophyllum peltatum*, the same plants as those used by the author in his previous paper[25] upon a related subject. The methods were also the same.

At an early stage in the development of the primary nucleus of the embryo sac a remarkable differentiation takes place in the cytoplasm. Numerous kinoplasmic threads appear which may form a felt around the nucleus, or may take the form of strands radiating from the nucleus, or may even be separated from the nucleus and form a bunch in one end of the cell. Later these threads disappear, and the cytoplasm seems to have a uniform structure. The spirem and segmentation stages take place just as in the author's description of pollen mother cells. He still regards synapsis as an artefact.

He refers to the only previous description of spindle formation in plants, that of Guignard,[26] who says the spindle takes its origin from two directive spheres. Since Mottier declares that there are no directive spheres in pollen mother cells or embryo sacs he necessarily looks for some other method of spindle formation. He finds kinoplasmic fibers variously arranged which press into the nuclear cavity as the nuclear membrane disappears. Some of these fibers become fastened to the chromosomes and soon form a multipolar spindle which quickly becomes bipolar. The chromosomes are V-shaped, with the point toward the pole. The first division in the embryo sac is heterotypic, and agrees fully with that already described in pollen mother cells.

The second division follows without a complete resting stage. The spindle formation is the same as in the first division, but not so easily studied. Mottier was surprised to find that the segmentation of the spirem came after

[23] Verhandl. Naturhist. Ver. Preussen Rheinl. **53**: 149–185. 1896. Cf. Jour. Roy. Micr. Soc. Dec. 1897, p. 553.

[24] Ueber das Verhalten der Kerne bei der Entwickelung des Embryosacks und die Vorgänge bei der Befruchtung. Jahrb. wiss. bot. **31**: 125–158. 1897.

[25] Beiträge zur Kenntniss der Kerntheilung in den Pollenmutterzellen einiger Dikotylen und Monokotylen. *Ibid.* **30**: 169–204. 1896.

[26] Ann. Sci. Nat. Bot. VII. **14**: 163–296. 1891.

the spindle was fully formed. The same phenomenon was described by Professor Coulter[27] after Mottier's article was written, but before it had reached the Chicago laboratory.

The third division is like the second rather than the first. The lower antipodal spindle is often abnormal, but the division is not considered amitotic as described by Miss Sargant. The polar nuclei, unlike the synergids and the egg, are not surrounded by a "Hautschicht," that of the egg apparatus being formed from the connecting fibers. At the time of fusion both the sex nuclei are in the resting stage. The membrane between the nuclei disappears, and after the fusion it is impossible to distinguish the male and female portion of the new nucleus.

After describing nuclear division in vegetative cells, the vegetative division is compared with the heterotypic, the structure of the resting nucleus being the same in both. In both there is a longitudinal fission of the nuclear thread. In the heterotypic there is often a synapsis due to reagents. The chromosome segments form rings or ellipses, or lie over each other before they are arranged in the nuclear plate; and in separating, the V-shaped chromosomes have the spindle fibers attached at the apex, while in the vegetative form the spindle fibers are attached at or near the end of the chromosome.

Mottier finds that while a reduction in the number of chromosomes takes place in the primary embryo sac nucleus, there is no so-called reduction division. This does not agree with his work on pollen mother cells, and he will consequently reinvestigate that subject.—C. J. C.

[27] BOT. GAZ. **23**: 416. *pl. 32, figs. 10, 12.* 1897.